THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Problem-solving Teams In Shipbuilding

U.S. DEPARTMENT OF TRANSPORTATION
Maritime Administration and
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Marine Construction Division

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The National Shipbuilding Research Program is a joint government and industry program dedicated to improving productivity of shipbuilding, overhaul, modernization and repair by seeking, developing and implementing new ideas, technologies and equipment in the Nation's shipyards. This research project was conducted under the auspices of Panel SP-5, Human Resource Innovation, of the Ship Production Committee of the Society of Naval Architects and Marine Engineers (SNAME). Frank Long, principal consultant of the consulting firm Win/Win Strategies is the Chairman and Program Manager of Panel SP-5 and served as principal author of this deliverable. EB-GD is grateful for his advice and guidance throughout this project.

The purpose of this project was to develop and implement an effective method of establishing problem solving teams in the shipyard. The employee involvement process at EB-GD, required for this process, could not have worked without the support and cooperation of the Metal Trades Council (MTC) of New London County which represents the hourly workforce. Roger Dawley, Business Representative of the MTC, served as the union's representative on the Project Steering Committee. We are grateful for his insight and support throughout this project. Fred Miller, formerly Special Assistant to the Vice President-Operations, who was the initial Manager of this project deserves special recognition. Through his direction and understanding, a successful program of cooperation and participation has been realized which will be the basis for future management-labor team efforts. The author also acknowledges the unique contribution made by Tom Sheldon who, without any prior experience with the project, was thrust into the role of Fred Miller's successor. A large measure of the continuing successes of the problem solving teams is owed to his efforts. He also performed a great deal more editing of this report than he bargained for. For both contributions the author is especially grateful.

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PROBLEM-SOLVING TEAMS IN SHIPBUILDING

SECTION I

ABSTRACT

The purpose of this report is to document General Dynamics Electric Boat Division's efforts in developing and implementing an effective method of establishing problem solving teams in the shipyard. Electric Boat was awarded a grant from the Human Resource Innovation Panel (SP5) of the Society of Naval Architects and Marine Engineers (SNAME) to study the results of problem solving team activities.

SECTION II

EXECUTIVE SUMMARY

Beginning in 1982, Operations Management at EB-GD began serious efforts to improve productivity using traditional, management-driven, top-down approaches e.g. organizational reviews, reexamination and reevaluation of basic shipbuilding techniques, effectiveness of support departments, training improvement and the expansion of computer technology in the production area. All of those approaches were effective to a greater or lesser degree, but none did the job that Management was convinced was possible.

It began, therefore, to look for solutions in other areas.

One of these solutions was the establishment of Problem Solving Teams as described in this Report. Unlike other programs which were being conducted concurrently at Electric Boat, these teams involved members of the production work force directly in the making of decisions that affected their own work. This critical difference was considered by many to be the key element in making significant improvements in productivity. Because labor hours represent the greatest expense in the submarine building business, even minor improvements in work force productivity can result in significant reductions in manhours expended.

The decision was made to investigate participative management by experimenting with the development and implementation of an effective method for establishing problem solving teams in the shipyard. The unions were consulted on various aspects of the experiment. By the early Autumn of 1986, five (5) teams had been established, oriented and were functioning.

Over the course of the next eighteen (18) months, the SP-5 Problem Solving Teams cost Electric Boat Division less than $45,000, yet the combined savings and savings potential for the contributions made by these teams exceeded $700,000. A pipeshop team implemented a savings of approximately 12,705 manhours on just one suggestion. A welding team proposal, which is currently being implemented, promises savings of well over 20,000 manhours per ship. Other teams, while posting less dramatic results, contributed significantly to improving the efficiency of their operating systems and processes. In all areas where teams were formed, the attitude of all team members changed to permit a freer exchange of ideas in an environment of mutual respect and esprit de corps.

While departures from the original intent of the teams as to size, membership, training and other areas occurred as they began to take on a life of their own, the problems they experienced and the manner in which they addressed those problems, as well as their successes, provide some bases for improving the process as described in Section VIII.

SECTION III

BACKGROUND

The Electric Boat Division (EB) of General Dynamics is an internationally-known pioneer designer and builder of submarines. Founded in 1899 to complete construction of the U.S. Navy's first submarine, HOLLAND, Electric Boat continued to lead the way to subsequent technological breakthroughs, including the first

nuclear-powered submarine, NAUTILUS, in 1954; and the first nuclear-powered, missile-firing submarine, GEORGE WASHINGTON, in 1959.

Today, Electric Boat is involved in the construction of both TRIDENT and LOS ANGELES class submarines, as well as the design of the propulsion plant for SSN 21. Major submarine assembly is performed at the unionized Groton, Ct. main yard. An Automated Submarine Frame and Cylinder Manufacturing Facility located at Quonset Point, Rhode Island performs an increasing amount of hull cylinder outfitting prior to shipment for final assembly at Groton. This non-union facility, the only one of its kind in the world, is presently fully operational.

Current employment at Electric Boat facilities in Connecticut and Rhode Island totals approximately 25,000. Stanley C. Pace is Chairman of the Board and Chief Executive Officer of General Dynamics. Herbert Rogers is President of the corporation, and Fritz G. Tovar is Vice President and General Manager of the Electric Boat Division.

In June 1945, the Metal Trades Department of the American Federation of Labor succeeded in an election to represent the production and maintenance workers at the shipyard.

The day-to-day activities of the Metal Trades Department at the shipyard are carried out by the Metal Trades Council of New London County (MTC), acting, under certain circumstances, as the Department's agent. The first labor agreement between the parties was negotiated by the MTC in September, 1945.

The MTC consists of six representatives of each of ten local unions whose parent organization is a member of the Metal Trades Department. The ten local unions are locals of the following:

Boilersmakers	Machinists
Carpenters	Painters
Clerks	Pipefitters
Electricians	Teamsters
Laborers	Molders

Those sixty representatives are elected by the rank and file of their respective locals and among themselves they elect the officers of the MTC. The MTC acts as the representative of the P & M workers when the entire body of workers (all ten locals) are involved, e.g. it negotiates the labor contract which must be ratified by the rank and file. The MTC is not, however, involved in routine business dealings between a particular local union and the company and it has no authority over any of the ten locals when it is involved in a conflict with the company. Each of the locals is autonomous and supports its own interests as much as practicable.

A "Recognition and Union Security Clause" providing for a union shop first appeared in the 1962 labor agreement.

Strikes and protests occurred in 1962, 1965, 1968 and the last one (five months) in 1975.

From that point on and continuing to the present, union/management relations can be described as relatively calm and cooperative and have dovetailed with a period of growth and change in the shipyard management and its human resources organization.

However, craft jurisdiction problems have continued to exist in the shipyard as they have in other shipyards in this country. Problems dealing with interchangeability were major issues in the strikes that took place in both 1965 and 1968. In 1972, although no strike occurred, interchangeability continued in the forefront of major issues in negotiations. The labor agreement which resulted from those negotiations contained language that addressed the issue.

Contrary to expectations, however, that new language did not resolve the conflict between the parties and interchangeability and work practices became the major issues in the 1975 negotiations. The five month strike which attended those negotiations was settled only with the inclusion of additional new language (identified as Memo 11).

Nevertheless, as before, the interpretation of that language has been continually pursued through the grievance and arbitration procedure. To this day, it persists as the major non-wage issue between labor and management.

It is against this background that the approaches described in this paper were implemented.

SECTION IV

INTRODUCTION

From the outset the driving force behind the experiments in human resource innovation represented by the projects described in this Report was a search for a way to enable the Division to make a quantum leap in

blue-collar productivity improvement and, thereby, establish for it, a significant competitive edge. The decision to undertake this research in human resource innovation came about after five years of effort to improve productivity using traditional approaches.

While many improvements had been realized, Operations Management came to believe that the quantum leap desired was to be found in these approaches. The achievement of that competitive edge was going to have to come from an area that had not, to that point in time, been developed to its fullest — the inclusion of the labor force in problem solving and decision making.

It was believed that because of the great mass of labor involved in the construction process, modest increases in labor productivity of about 5% would translate into significant dollar savings. It was also felt that a 5% increase was easily within the realm of probability and overall increases of 15% and even 20% were within the realm of possibility.

If a changed approach to managing the workforce was implemented and productivity improvements of the above magnitude were realized, the competitive edge would become a reality.

This approach was rooted in a belief that a significant difference existed between the shipyard work environment of today and that of a generation ago. Today's worker has a larger fund of knowledge than his parents because of his education, (as that term is used in the broadest sense). The American lifestyle is now characterized by different sets of values, greater social awareness and a lower respect for authority, per se, by the typical employee. Accordingly, the traditional management philosophy as to its relationship with the workforce needed to be reconsidered.

Also at about this time Operations Management became aware of initiatives throughout industry in areas of participatory management and employee involvement. While various approaches, such as Quality Circles, had been tried in the past with minimal success, the nagging feeling persisted that the brainpower of the production workforce had not been successfully tapped. The fact that initiatives were underway elsewhere and the fact that there existed a Panel sponsored by the Ship Production Committee of the Society of Naval Architects and Marine Engineers to conduct research in these very areas encouraged management to explore this matter further.

The plan that began to take shape was to test the thesis that a different approach to managing the workforce was a key ingredient, if not the key ingredient, to achieving the competitive edge. Experimentation in participative management would begin with specific, trained individuals spearheading the initiatives in a certain few specific departments where initial success was most likely to occur.

It was also believed that the effort would require the following basic attributes:

a) Senior Level Staff Leadership from Operations. This was necessary to give the project credibility and to provide a means of knocking down traditional, chronic barriers in idea implementation.

b) Straight forward, honest information exchanges between the unions and management on the project.

c) Rules and policy development for the teams so that clear scope and intent could be established while working on specific creative ideas in a traditional environment of instability and distrust.

d) A desire from both groups (management and labor) to cut through each other's bureaucracy and make ideas work.

e) Visible support from top management and union officials. In this case the Division Vice President-Operations and the President of the Metal Trades Council.

Success was to be defined as increased productivity as measured by actual savings in manhours or material dollars.

The Role of the Unions

The concept of experimentation with employee involvement and work teams was initially discussed, informally, between a representative of the V.P. — Operations and various Officers including the President of the Metal Trades Council (MTC) of New London County and certain members of his staff.

This approach, that is, an approach to the Unions by an 'Operations' person, as opposed to an approach by someone from the Human Resources group, was chosen in an attempt to remove the subject matter from the adversarial arena of Union/Management relations.

That approach resulted in neither the cooperation that management had hoped for nor the complete opposition which management had feared. Due to the Unions' general lack of knowledge of Employee Involvement activities the Union Officers agreed to host a presentation on Employee Involvement. The nature of the National Shipbuilding Research Program and the role of the Human Resource Panel, Panel SP5, was presented by the Chairman and the Program Manager of that Panel at one of the Metal Trades Councils' regular meetings.

The cooperation the Unions extended was tempered with large amounts of skepticism and doubts as to managements' sincerity and good faith. They were willing to

go along at arms length; and to wait and see. Initially, the go/no go decision was supported by MTC President Tom Kiddy on the basis of "giving it a shot."

The Officers also agreed to serve on a Union/ Management Steering Committee which was to have oversight responsibility for the problem solving teams and to establish the guidelines for subject matter which could be addressed vis-a-vis the provisions of the Labor Agreement and jurisdictional guidelines. Mr. R. Dawley was selected as the MTC's coordinator.

The Official Board of the MTC played no other role in the effort and, in fact, avoided any active identification with it.

On the other hand, with the single exception of the International Association of Machinist and Aerospace Workers (IAM) the Unions (and for that matter the management) were diligent in ensuring that the membership of each problem solving team included one or more Shop Stewards. The IAM has historically and consistently opposed the establishment of employee involvement programs on the grounds that they are unnecessary where a Union is present and are also a device by which management can weaken a union. After some initial participation on the Equipment Control Center problem solving team, an IAM representative withdrew.

SECTION V

ESTABLISHING THE PROBLEM SOLVING TEAMS

By Inter-Office Memo dated October 23, 1985, Vice President-General Manager F. G. Tovar announced receipt by Electric Boat, Groton, of the subcontract from Bethlehem Steel to conduct the research covered by this Project. Fred E. Miller was appointed as the Project Manager.

The Project Manager met with senior Union representatives to 1) establish a joint Union/Management Steering Committee, 2) identify the individuals to serve on the Steering Committee and 3) to assign specific responsibilities to individual members (e.g. training, coordination, program management, etc.). Subsequently, the Steering Committee met to identify those subjects which were off-limits for the Teams because of labor agreement considerations. (See Table I below.) Also, it was generally agreed among the members of the Steering Committee that each team would basically include:

Team Leader (Management)
Supervisor
Union Representative, and
Two Hourly Representatives

The Project Manager began by identifying the Operations departments where problem solving teams would first be established, and, within those departments, the management members who would lead the process. It was decided that the first five teams would be formed within the Drilling*, Welding, Painting, the Pipefitting, and the Equipment Control Center Departments.

TABLE I

PROBLEM-SOLVING TEAM BOUNDARIES

OFF-LIMITS AREAS	PERMISSIBLE AREAS
SALARIES	PRODUCT QUALITY
UNION GRIEVANCES	WORK ENVIRONMENT SAFETY
UNION CONTRACT	SAVINGS IN MATERIAL AND INVENTORY COSTS
BENEFITS	IMPROVEMENTS IN PROCESS, METHODS, OR SYSTEMS
COMPANY POLICY	IMPROVEMENTS IN FACILITIES, TOOLS, OR EQUIPMENT
WORKING HOURS	REDUCTION IN PAPERWORK
RATES	ELIMINATION OF WASTE OR MATERIALS AND SUPPLIES
BREAKS	QUALITY
CLASSIFICATION	SCRAP
OVERTIME	REWORK
PERSONALITIES	LOCATIONS OF EQUIPMENT/ MATERIALS
PAYROLL	
DISCIPLINE	

* In its first meeting after formation, the Drillers Team identified as its only problem areas certain tools and equipment. Those problems were immediately resolved by Management and the Team disbanded.

SECTION VI

THE PROBLEM SOLVING TEAMS

Equipment Control Center Problem Solving Team

The Equipment Control Center, under the direction of a Superintendent, is responsible for maintaining, repairing, setting-up and removing welding equipment in the shipyard. There are 64 people in the department of which 25 are machinists represented by the IAM, 31 are electricians represented by the IBEW and the remainder are supervisory, clerical and administrative personnel.

At the outset the team members were the Superintendent, his principal assistant, the Machinist Shop Steward and the Electrical Shop Steward. The team met regularly for one hour every other week on Company time. Minutes were kept of each meeting.

The first order of business the team tackled was an examination of skill levels and capabilities of the hourly work force to ensure that in the event it became necessary to reassign individuals within the department it (the department) would achieve the optimal match between the skill levels of the individuals and the technical demands of the work to be performed. Fortunately, from a team-building standpoint there was virtual unanimity of opinion as to the skill levels and work habits of each member of the workforce. The Union representatives identified a certain few individuals who, in their opinion, were under-classified and under-paid. Upon further review by the Superintendent with members of supervision most intimately familiar with the individuals at issue, they were reclassified and paid a higher wage on the basis of their acknowledged demonstrated skill and ability.

The manner in which that first problem was addressed by all of the team members laid the groundwork for the mutual trust and respect which this problem solving team developed.

The machinists and electricians are assigned work orders by the ECC supervisor in charge of the shop. Work orders are written to request support services in all areas of the shipyard. For example, a particular semi-automatic or automatic welding machine may be needed in a specific location, a problem machine may require repair, a particular welding apparatus may require dismantling, etc. The supervisor performs field inspections of worker performance and work in progress. When in the shop, he assigns the work as described on the written work order to a particular mechanic or electrician (or combination) on the basis of the individual skill and the technical nature of the work. If the supervisor is unavailable to assign the work orders because of the press of his other duties, they sit.

The team decided to experiment with allowing the workers to pick up the work orders on their own rather than being assigned or waiting to be assigned by a supervisor — an acknowledged attempt at self management. The experiment was received very positively by the workforce to the extent that, at times, the workers picked up the work orders themselves even if a supervisor was present. At times, the workers accepted work orders directly from the person requesting their services. In addition to the increased job satisfaction experienced by the mechanics, the new procedure resulted in improved response time.

Response time is defined as the time interval between receipt by the ECC of a request for service, as represented by a work order, and a positive response to that request. In September, 1986, (prior to the organization of the ECC Problem Solving Team) average response time was 30 minutes. By May and June of 1987, average response time had decreased to 11 minutes per request for service.

In September of 1986 total repair time (response time plus the time required to complete the repair) was in the range of 70 to 75 minutes per occurrence. In the May and June 1987 time period, total repair time had decreased to about 54 minutes.

The average number of breakdowns per day in that September 1986 to June 1987 time period was eighteen.

This performance represents an overall increase in productivity of about 25% per repair. In addition the productivity of the welders who are serviced by the ECC has been increased because their "wait for repair" time has thus been reduced.

In addition, the workers have taken over the function of inventorying the materials and supplies used in the performance of their work and writing requisitions for materials to be supplied by in-house sources. In the past, those responsibilities rested with supervision. Because of supervisions lack of hand's-on and day-to-day involvement with the stock many times items were not ordered until their supply was completely depleted which usually came to management's attention by way of complaints from the supported trades (Welders). For all intents and purposes, that problem has been completely resolved. As the Superintendent of ECC describes it:

"My measure of success is the comments from the supported trades as I walk through the shipyard or answer the phone. Prior to the new procedure, not a week would go by that someone wasn't complaining about ECC being out of one thing or another. It has now been over six months and I can't remember the last time someone called or stopped me to complain about ECC being out of some item."

The Union members of the team also suggested that they be invited to attend meetings with vendors on the grounds that their hands-on experience could provide the basis for another point of view in evaluating the vendors product. That suggestion was adopted and has become the "modus operandi" in the department. In one such example, a prototype of a Gilliland Power Supply, after review by the Problem Solving Team members, was changed by the vendor to make the unit more acceptable from the standpoint of the operator and the repair personnel with no increase in unit price. In other instances the mechanics' input has resulted in a much improved piece of equipment or has led management to decide against purchasing an item under consideration.

The Pipefitters Problem Solving Team

A problem solving team was established in a group within the Groton Nuclear Piping Department known as the Inscription/Hanger Rework Facility. This group consists of 45 employees out of a total of over 2,000 employees under the supervision of the General Superintendent-Piping. The management members of the Team were selected by the Project Manager and included the Superintendent and a salaried Foreman. The Union was represented by a designated representative and two other pipefitters that he had selected.

The first meeting took place in early October 1986. In that meeting, the Project Manager conducted a one and one-half hour orientation for the team members introducing them to the basic concepts of brainstorming, team building and problem solving. He also reviewed the types of problems the team should address and those they should avoid.

Thereafter, the team met regularly at a set time for one hour each week on Company time. Minutes were kept of each meeting and those minutes served as the Agenda for the subsequent meeting.

There was no active attempt to report to or communicate with the rest of the employees as to the functioning or activities of the Team. As time went on, however, and others became aware of the Team's activities, there began to develop among the other employees a general attitude that the Team concept would not work and that nothing would come of what the Team was doing.

Nevertheless, the Team members reported a good sense of interaction and communications among themselves which resulted in stimulating and productive brainstorming sessions. One result of an early brainstorming session was the identification of a problem with gauge board hanger foundations. The foundations were manufactured by a subcontractor and, for whatever reason, about 80% of them had to be significantly altered by the Inscription/Hanger Rework Facility before they could be installed aboard ship. The Team concluded that significant savings could accrue to the Yard if the hangers were fabricated in-house.

The Team described a "before and after" scenario as set forth below:

GAGE BOARD/HGR. FDN. PROJECT

METHOD	SUBCONT M-HR/HGR	E.B. M-HR/HGR	EB AVHR REWORK PER HGR	TOTAL II HGRS	TOTAL M-HRS EXPEND	M-HR SAVED PER SHIP	MANHOUR SAVINGS REMAINING HGRS
Old	12	0	5	165	2805	N/A	N/A
							5775 = 2.78
New	0	12	0	165	1980	825	Man Years

Additional Benefits:

- Build Multi-Shipsets-Potential 10% Added Savings
- Single Station Fabrication and Assembly
- Reduce Material Handling

NOTE: The 5 Hour Rework Figure Includes All Affected Dept's.-Trades 4 Hrs., Support 1 Hr.

FIGURE 1

Figure 1 shows that if the hanger foundations were produced in-house, the average 5 hours of rework per hanger foundation would be eliminated. This would amount to savings of approximately 825 manhours per shipset or a total savings of 5775* manhours.

This proposal was presented and favorably received by management representatives from the Planning Department during a regular Team meeting. Subsequent reviews were conducted by the Labor Budgeting group as the Project Manager persisted in moving the proposal through "the system." This was necessary because a formal structure or procedure for the Team to make and defend its proposals before a decision making body had not been established. Nevertheless, in this instance, "the system" responded favorably to the Team's proposal and the work on the hanger foundations for the remainder of the ships in the series was reassigned to Groton for fabrication.

A second Pipe Shop Problem Solving Team was established and held its first meeting on March 6, 1987. The Nuclear Pipeshop Superintendent assigned a General Foreman who had not participated in the first team to replace him as Team Leader. The same Salaried Foreman from the initial Team remained on the new team as a management representative. In contrast to the selection process used for the initial team, hourly employees were solicited by the Union representative to volunteer. This process met with considerable success and a total of four hourly employees were selected including the Union's Business Agent.

As before, the Team met weekly at a set time for one hour. Minutes were kept of each meeting and served as the Agenda for the subsequent meeting. This team did not receive the benefit of the one and one-half hour orientation session which had been conducted by the Project Manager in the past. The first meeting, held on March 6, 1987, was devoted almost entirely to brainstorming which resulted in the identification of eight problem areas. The minutes of that first meeting concluded with the following notation:

> *"Next meeting to be held at 10:00 a.m. on Friday, March 13, 1987. Objectives to be further brainstorming of problems in order to establish a format for solving them."*

The Team continued to meet until September of 1987 and investigated each of the items which surfaced in the March 6, 1987 meeting. Each of them was chased to a dead-end because the problem either did not actually exist; was being addressed by others; or had been resolved by others. (The benefits which flow from an exercise whereby team members identify a perceived problem and chase it to an acknowledged dead-end should not be overlooked or underemphasized.) Unfortunately, on two separate occasions the team suffered a loss, by transfer, of the Team Leader. The Pipefitters Problem Solving Team is currently inactive.

The Painters Problem Solving Team

The Painters Problem Solving Team held its first meeting on July 17, 1986. The Management members of the team consisted of a General Foreman, a Foreman and, as Team Co-Leader, a Trade Training Supervisor. They were selected by the Project Manager. The hourly representatives were selected by the Painter's Union Chief Steward/Business Agent and included six painters. The Business Agent also served in the capacity of Co-Leader. Initially, the team met for about one hour every other week on a flexible schedule. Minutes were kept of each meeting.

As set forth in the minutes of the first meeting: "The objectives of the team were discussed and it was determined that the team would explore the quality of life in the work area and identify areas and provide recommendations to improve productivity."

It should be noted that this is the only team which specifically listed as one of its objectives an improvement in the quality of life in the work area. In its first meeting the condition of and adequacy of supplies in the bathroom facilities was listed as a high priority problem area.

The team conducted five regular meetings between July 17 and September 25, 1986. The Department Superintendent sat in on the meeting held on September 25, 1986.

On October 2, 1986, an incident occurred in one of the yard's parking lots which resulted in the estrangement of the team's Co-Leaders. Meetings did not resume again until March 27, 1987.

In that meeting the former Management Co-Leader was replaced by the General Foreman. The Union's Business Agent was not replaced and continues to be listed as a team member. He has not, however, attended any meetings since the October 2 incident.

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* Based upon seven remaining ship contracts. Actual experience resulted in not only the elimination of the 5 hours rework time, but also a reduction in fabrication time from 12 hours to 6 hours. Actual total savings for the seven shipsets was 12,705 manhours.

The minutes of the March 27, 1987, meeting contain an excellent synopsis of the past and future work of the Painters Problem Solving Team. The problems listed in those minutes and the results of the Team's efforts are as follows:

"A brief review of previous topics started the meeting, chaired by (General Foreman). It was agreed the new Paint Department tool cribs, being implemented by Tools and Equipment Department will significantly improve productivity. Painters will obtain all required tools at one crib. Also, accountability for the tools will be increased through the use of the Automated Tool and Inventory Control System. All members agreed the new tool cribs should vastly improve the tool/equipment situation for the Paint Department."

Result: Three dedicated painter tool cribs have been established and are working effectively. Painters are now spending significantly less time obtaining the proper tools for their jobs.

"The members felt oil base paint sticking to the plastic buckets is a problem requiring attention. The oil base paint, once dried, is difficult to remove and time consuming for shop personnel. Department Supervisor will investigate possible effective methods of removing this paint."

Result: Plastic buckets for oil based paint will be used until the paint builds up to the point the bucket is no longer useable. No cost effective way of removing the paint has been found.

"The discontinuation of 3rd shift was felt to be a possible problem for issuing paint at the start of 1st shift. No epoxy paint will be available if shop personnel start at 7 AM. If Paint Department personnel have to return to shops ½ to ¾ hours later to get epoxy paints, it could be detrimental to productivity. Department Supervision will evaluate the need for some shop personnel to begin their shift ½ hour earlier."

Result: Third shift Equipment personnel mix the required epoxy paint that will be used on first shift in each of the three Paint Department cribs issued paint. This allows more effective use of personnel without incurring additional overtime or creating special shifts.

"The team members agree a smaller plastic paint bucket could reduce paint waste and be less clumsy. Also, handles are prone to fall off on the buckets we presently use. Department Supervision will investigate both issues."

Result: One-half gallon plastic buckets have been purchased and are working out well. Shortly they will replace the use of the one gallon plastic buckets to a larger extent.

"Using disposable plastic coveralls was discussed as a means of reducing blast grit contamination on blaster's clothing. They also may save coveralls from heavy paint accumulation when worn over regular coveralls during spraying operations. Also, team members mentioned laundered coveralls were not being mended and may even become damaged by the laundering process. Department Supervision will investigatge."

Result: Polyethylene coated Tyvek coveralls have been chosen as the type of coverall that will be used for spray painting M.I. paint. This will protect personnel from the n-butyl in the M.I. paint.

"The feasibility of using plastic 5 gallon buckets for mixing paint was mentioned. This could reduce the Paint Department's hazardous waste level. Buckets could be cleaned for re-use. Department Supervision to investigate."

Result: Five gallon plastic buckets have been purchased and will replace the use of steel buckets for mixing paints. Also, the Fire Department has approved the use of plastic buckets for hull painting jobs located in the enclosed graving dock.

The Team has, so far, generated and implemented productivity improvements and cost saving ideas that are estimated to provide $250,000 savings in labor and material per year. Approximately 75% of these savings will be realized due to the implementation of using one-half gallon plastic buckets for issuing paint. The reduction in overall paint usage and waste paint generated will result in significant reductions in material and waste removal costs.

The Welding Problem Solving Team

The Welding Team was first organized in August of 1986. Its membership was selected by the Project Manager and was comprised of seven hourly Welders including Union representatives and five members of Management, including the department Superintendent. As with the other teams which had been established at about the same time, the first Team meeting consisted of a one and one-half hour orientation session devoted to brainstorming, problem solving and team building as well as a review of matters which were "off limits" pursuant to the Steering Committee's guidelines. The Team met weekly for one hour each week and kept minutes of each meeting. Set forth below are excerpts from the minutes of the meeting held on September 9, 1986.

"DISCUSSION: The topics reviewed at the August 29, 1986 meeting, as possible candidates for problem solving, were reviewed again in relation to potential cost savings, the likelihood of improvement, and the probability of convincing people that a change is needed. The topics were rated on a scale of 1-10 in each category with number 10 representing the highest possibility of achievement. The results are as follows:

Topic	Potential Cost Savings	Likelihood of Improvement	Probability of Convincing People
1. Mechanization/ Ceramics	10	6	10
2. ECC Electrician Support Time	3	2	4
3. ECC RM	2	2	4
4. Work Start-Ups	5	10	10
5. Locating Leads	5	10	10
6. Gang Boxes	5	9	10
7. Inter-Trade Cooperation	7	5	4
8. Inconsistent Output	5	6	7
9. Skill Equity	5	6	7
10. Supv./Employee Communication	4	6	8
11. Supv. Plan Work	4	6	8
12. Complicated Welds	2	3	4
13. Material/Equipment	5	9	10
14. Weld Wire System	2	4	4

During the rating process it was determined that the (14) topics could be placed in (3) different groupings, under the headings: Welding Technology, Shift Start-Up, and Supervision/Crew Relationship. The topics were then combined under their appropriate heading, and the ratings for each category were then tallied. The results are as follows:

Group	Area of Concern	Potential Cost Savings	Likelihood of Improvement	Probability of Convincing People
1	**Welding Technology** (Topics: 1,2,3,7)	22	15	22
2	**Shift Start-up** (Topics: 4,5,6,13,14)	22	42	44
3	**Supervisor/Crew Relationship** (Topics: 8,9,10,11,12)	20	27	34

As indicated above, group number (2) appears to be the most achieveable. The committee voted unanimously to accept group number (2) as it's first project."

As discussions developed and solutions were proposed in several immediately subsequent meetings, a jurisdictional conflict arose since the solution to certain problems required that work being performed by one craft be assigned to another. From that point on the Team's efforts began to deteriorate and meetings were eventually suspended.

In January 1987, however, the Welding Department underwent a change in upper Management and Team meetings were restarted on February 25 with some changes in Team membership. Most notably, the team was reduced to about seven members: the management representatives were changed to include the Welding Superintendent, a Welding Engineer and a Production Methods Supervisor. The Steel Trades General Superintendent also attended meetings. The Team decided that no significant progress had been accomplished in the prior meetings and that a reassessment of the Team's priorities was in order.

The Team concluded that the prior effort had faltered because the Team had not sufficiently focused on an objective. The new effort would be directed toward a single goal, viz., yardwide acceptance and extensive utilization of ceramic-backed welding. The Team was convinced this very valuable, fully approved technology existed and, if exploited to its fullest, could save the Company enormous amounts of money through reduction of welding support work including grinding, backgouging, second side preparation, backgouge MT, and firewatch time. The only negative offset would be time spent in making the better fitups essential for successful one sided welding.

It became the Team's goal to prove to Management, from first line Foreman to the Yard General Manager, that this technology should be utilized far more than was then the case. One of the greatest hurdles to overcome was a fear on the part of most first line Welding and Shipfitting Foremen and General Foremen that the technology was far too difficult to master to be practicable as a routine production technique. The Team chose to overcome that fear by demonstrating that, if a few basic rules which are simple to understand and simple to apply are followed, ceramic-backed welding is really an easily mastered process. In order to implement its objective the Team developed a training program for first-line Foremen and General Foremen. This included documented details of the ceramic-backed welding process, including the creation of a display board showing the various shapes and placements of the ceramic tiles.

By November 1987, the Team, with the hourly employees responsible for most of the effort, was ready to

make a presentation to top Management showing the economic and production benefits of ceramic-backed welding. They demonstrated its many uses by means of a slide presentation, explained the essence of the training program, and made an appeal for support of its ceramics-backed welding campaign. An excerpt from the presentation is cited below:

> *"The savings in the program are real, and the way we see it can be unlimited. We were challenged once in SP5 that we can put miles between us and the competition. We are here today giving you a viable way to put some distance into that mile. Who knows, if this process was used more effectively in the past we would have the competition on their heels. But we need your support of this program to get the kind of money savings response and First Time Quality that will be achieved. Not to be afraid to blow a shipfitting budget by 500 hours if you save 7000 on the welding side of the coin, not counting the savings in grinding and inspection."*

Top Management received the presentation enthusiastically and commissioned the Team to begin to implement, on an extensive scale, the training program it had recommended — not only at Electric Boats' Groton facility, but at the Quonset Point Facility as well.

This Problem Solving Team intends, as its next venture, to revamp procedures for the Welding School once it has completed its campaign on behalf of ceramic backed welding.

The Arc-Strike Problem Solving Team

The experiences of the Ceramic-Backed Welding Team caused substantial interest in the Steel Trades and in the Welding Department in particular.

In November, one of the Welding Department General Foremen believed that a solution to the historical problem of arc-strikes might be achieved if it had more attention than it had theretofore received and suggested to the Welding Department Problem Solving Team that the matter be addressed. The suggestion had appeal because the problem, like the ceramic-backed welding issue had a narrow focus and would not be subject to a broad gauge approach like the one that had caused the initial Welding Team effort to fail. However, the Welding Team was already fully occupied by its ceramic-backed welding issue and did not want to dilute this effort. For this reason, and because of the enthusiasm, dedication and apparent success of the ceramic-backed welding effort, it was decided to create a second problem-solving-team to analyze the arc-strike issue. An Arc-strike Team was thus established.

Arc-strikes are a continual problem in the construction of submarines. Close and congested quarters constitute the normal environment for those employees engaged in installing material aboard submarines. The installation of much of that material requires tack welding and final production welding. In the course of positioning themselves to perform their work, employees using welding "stingers" frequently and inadvertently touch the energized welding rods against metal parts, for example, pipes and pipefittings within their immediate surroundings. These arc-strikes contaminate and deteriorate the quality of the piping systems to the point where they must be repaired, if possible, or replaced if not. In either event, an expense not otherwise anticipated is incurred. For all practical purposes, such arc-strikes have historically been considered an unavoidable occurrence during submarine construction.

The Management members of the Team included the above-mentioned General Foreman as Team Leader, the Department Superintendent and an Engineer. The hourly team members include two welders, one grinder, one pipe hangerman and one pipefitter.

It is this Team's intention to measure the extent of the problem in terms of frequency and severity (and cost of repair) and, insofar as practical, the obvious and not so obvious causes of the arc-strikes over a representative period of time and, thereby, establish a standard by which to measure improvements. Methods to eliminate, or, at least diminish, the occasions and extent of damage of arc-strikes were devised through a combination of work redesign and insulating equipment. The team has currently identified and experimented with various insulating materials and has used innovative methods of fitting and fastening the insulating materials to pipes of various sizes and configurations. An interesting side effect of these new applications is that they are coming into wide spread use throughout the yard in areas not originally contemplated.

SECTION VII

TEAM SELF ASSESSMENT

On October 13, 1987, the Project Manager sent the following questionnaire to each of the Problem Solving Teams.*

1. At the beginning of the Problem Team project you were given introductory training to start the problem solving process. Considering your projects to date, state whether you could have benefitted from additional training in the following areas and why:
   (a) Stages of group development?
   (b) Characteristics of effective and ineffective groups?
   (c) Group process?
   (d) Methods for overcoming resistance to changes?
   (e) Problem identification?
   (f) Problem selection?
   (g) Problem analysis?
   (h) Action planning?
   (i) Project development for management?
   (j) Proposal presentation to management?
   (k) Proposal implementation and project control?
2. How would you assess the current interest level of the team members in the team activities? How has this evolved during the team process and what do you think are the most significant reasons for these changes?
3. If the number of Problem Solving Teams were to increase at Electric Boat, how many of your team members would want to participate, and why?
4. What additional support is required to improve the effectiveness of your Problem Solving Team at Electric Boat? Please specify what specific area(s) is lacking and **who** you think would be the **best** person to provide this support.

Responses were received from the Welders and the Painters; the Pipefitters and the Equipment Control Center teams were at that time in a state of uncertainty.

The Welder Team Response

1. Reference (a) requested that the . . . team leaders review and respond to questions regarding the teams needs and development. These questions were discussed during a special (Welder) team meeting and the following responses developed:

Question 1. (a) No training required, group considers itself to have developed into an effective homogeneous group.

(b) No training required — see 1 above.

(c) Training considered valuable in order to assess group structure and formalize communication chains.

(d) No training required — Group doesn't feel resistance to change to be a problem during discussion.

(e, f, g, h, i, j, k) — Group feels that training in all of these areas would provide valuable insight into problem analysis, identification and presentation to management. The group agreed that problem solving is done at management levels and that any skills that would help relay information could be of value.

Question 2. The group considers its current level of interest to be very high. Everyone shows a consistently high level of enthusiasm and commitment to purpose. Since January of 1987, the group has established a concrete purpose and direction. Camaraderie is high both in and out of team meetings. No union/management friction exists and the cross trade participation has provided a valuable educational experience.

Question 3. All would participate again. Everyone enjoys having a hand in the problem solving process and being made to feel a part of what's going on. A higher level of self actualization is being achieved.

Question 4. (a) The team would like the training noted in Question 1 and a more priority response from support in Question 1 and a more priority response from support would also like to see more updates on the progress of other teams.

(b) Areas that are lacking . . .
   1. General Managers statement of commitment to SP5**.
   2. Information column in the Scope.
   3. Explanation to shipyard of what SP-5** is.

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* The Drillers Problem Solving Team was not included because, as mentioned earlier, that team disbanded after its first meeting.

** At EB-GD, generally, and among those involved in the problem solving team effort, in particular, the term SP-5 refers, interchangeably, to any one or all of the Problem Solving Teams and to the problem solving team concept. It is used here in that context and is not a reference to Panel SP-5.

4. More team leader meetings on all the progress of the program and its value to the division.

The Painters Team

Considering (the Paint Department's) Problem Team projects to date, we feel we could have benefitted from additional training in the following areas:

1. (e) **Problem Identification.** This is one of the key steps in the process. Group members need to be conscious of problem areas that they encounter in their day-to-day functions. Problems, whose resolution will significantly benefit the department's operating efficiency, are critical to the success of the whole process. To be successful, the team needs to address the problems of significance and develop workable solutions that will benefit their department, as well as the Division.

1. (f) **Problem Solving.** This is one of the most critical elements in the entire process. Additional training, in techniques for problem selection, would be of definite benefit and help increase the effectiveness and efficiency of group results. The team needs guidance in the type of problems that lend themselves to this approach in solving shipyard problems. Selection of problems, that merit attention, is critical to the success of the team effort.

1. (i) **Proposal Development for Management.** This is a weakness in our group. More attention is needed on methods of effectively presenting a proposal to management to increase its chances of being understood and acted upon.

2. Team interest is fairly high and encouraging. The interest has steadily increased as the team members realized that management will take action on problems that can be pursued and potentially solved. Once team members saw concrete action had taken place, they realized it's not just window dressing. They are encouraged because the management members listen and take their suggestions seriously.

3. I believe all of our team members would be interested in participation. The team members feel they have input that can benefit the operation of the department. I believe it makes them feel more a "part" of the Company and that their ideas will be heard and acted upon.

4. One area that could use attention is visibility. Minutes from the meetings only reach the department's superintendent level. It may be beneficial for the general superintendents to be, at least peripherally, aware of the problems and issues being addressed. Their support may be needed and their increased awareness could encourage that support. Another area, at least in our group, is a lack of a formalized procedure for presenting proposals to management. It could be beneficial to have a meeting of team leaders to discuss effective approaches and share ideas on how best to approach the various steps in the problem solving evolution.

SECTION VIII

OBSERVATIONS

1. **Management's Support Must Include All Levels of Management and That Support Must Be Readily Apparent to All Involved**

No report of this nature would be complete without mention of the support that must come from top Management to support the effort and provide it with the infusion of enthusiasm which is needed, from time to time, to maintain the high level of interest, enthusiasm and dedication of purpose of which, these teams are capable. Naturally, the size of an organization will influence the amount of time and control top Management devotes to any effort and the amount of time and control it delegates. Ideally, in an endeavor which has, at its core, a change in management style, the best example for the rest of the entire organization is the General Manager. At EB-GD, however, the General Manager's visibility throughout the organization, from the Main Office to the waterfront is, of necessity, diluted by the sheer size of the operation. His support in this effort, however, is apparent because of the establishment of the Teams and their continuing functioning and his and his staffs' attendance at and approval of the Ceramic-Backed Welding Team's presentation. Again, of necessity, he has had to delegate day-to-day responsibility to someone else in the organization. The Division Vice President-Operations whose responsibilities extend from the 10th

Floor of the Main Office to the waterfront, has accepted that role and has designated, as his alter ego in this effort, the Project Manager.

From the standpoint of the hourly team member on the watefront, however, his horizon does not extend to the Main Office. It extends to a lower level, somewhere in the production area in the shipyard. For the Management members of the team, their horizons extend somewhat further.

While the Project Manager speaks for the V.P.-Operations, his is a staff, as opposed to a line, position. None of the team members has an operations reporting responsibility to him.

In their responses to the questionnaire both Teams indicated a need for support from a higher level than they believed they were receiving. The Welders wanted a statement of commitment from the General Manager; the Painters wanted some involvement by the General Superintendents.

A greater perception of Management support is needed to sustain this effort.

It is generally agreed that if any level of Management in the chain of command thinks the effort is a waste of time the effort will fail. Each level of Management takes its cue from the level to which it directly reports. Foremen, General Formen and, in some cases, Department Superintendents actively participated in the Teams under study. Generally speaking, interest, enthusiasm and success were higher where the Departmental Superintendent was an active participant.

But, there are reporting levels between the Department Superintendent and the V.P.-Operations, many having no role in this Project. As stated above, the entire Management heierarchy must support the effort if it is to succeed. Each level should have a role to play.

It is recommended, therefore, that employees in the Director and General Superintendent levels actively participate in the problem solving team effort. Participation on a revitalized and strengthened Steering Committee is one area where their contribution could be significant.

2. **The Steering Committee Should be Reorganized and Its Role Expanded**

The Steering Committee itself is a valuable resource that unfortunately was left on the side lines during this Project once the teams were organized and functioning. It should be revitalized, strengthened, and given a major role in the oversight function originally intended for it. Its membership should consist of at least 5 members from Management and 5 members from the Unions, each of whom should have a position of substantial authority in his organization. One or more representatives of the MTC and Presidents of the Locals should be considered for the Union and persons in the Director and General Superintendent level for the Management.

They should meet regularly, perhaps once per quarter, and have Team Leaders report on their activities to them. The successor to the Project Manager and a designated Union counterpart should serve as Secretaries to the Steering Committee. The Co-chairmenship should be for one year terms and should be rotated among the membership.

3. **Procedures for Selecting and Disbanding Problem Solving Teams Should be Established and Formalized by the Steering Committee**

Each of the teams, with the exception of the Arc-Strike Team, was selected by the Project Manager. The Arc-Strike Team evolved, so to speak, from the success of the Ceramic-Backed Welding Team. As it turned out, the Project Manager was remarkably successful in his selections. His selections, however, were based upon his intuition and instincts. He did not establish any guidelines for others to follow and none currently exist. It is too much to expect that, as a matter of routine, new teams will surface on their own initiative and request recognition as the Arc-Strike Team did.

Procedures for new team selection should be established by the Steering Committee and communicated to all employees by means of a notice which contains the Steering Committee's imprimatur.

Similarly, procedures should be established for the disbanding of a team that has served its purpose or has landed in limbo, for one reason or another.

4. **Procedures for Selecting Team Members Should be Established and Formalized by the Steering Committee**

Membership in the Teams under study was accomplished in a number of ways, most of which seemed to work. The selection of team members is too important an element to be left to chance. The Steering Committee should examine the various alternatives and decide on those that are appropriate.

Experience indicates that the mix of management members and production workers on any given team is irrelevant, as is the presence or absence of a Union official. It is generally believed, however, that involving a steward from the outset is to the team's advantage.

A survey of employee (management and production worker) interest may be an appropriate way to develop a list of candidates for problem solving team membership. The key elements in the selection of any individual

should be that persons real interest in participating in the problem identification and solution process and working as a team member.

The responses to the Project Manager's questionnaire (see Section VI) indicate that there is a general lack of awareness of this Project. Taken as a percentage of total yard employment, the number of participants in the Problem Solving Team Project is miniscule. It would appear that a formal means of recognizing a persons participation would be required in order to achieve long term individual committment to a problem solving team process. For this reason a directed team approach — solving of a specific problem and then disbanding — might be best to ensure continued high levels of enthusiasm for the team process.

Experience also indicates that the team size should not normally exceed eight members. This size limits the adverse impact which attendance at meetings has on production, generally results in better attendance than larger groups experience and is also large enough to be able to tolerate some limited absenteeism.

5. **Meetings Should Be Held at Fixed Times and Places and Minutes Kept of Each Meeting**

The frequency of the meetings is not as important as their regularity. Within the constraints of practicality, of course, teams should meet with the frequency or infrequency with which they are comfortable and productive.

While brevity is desired, the minutes of each meeting should contain enough detail that an outsider could understand the substance of the discussion by reading a few back issues.

Minutes should be exchanged with all other teams. Exchanging and sharing minutes enhances the continuing education process and can be especially helpful to newly started-up teams.

6. **Formal Initial Training and Periodic Auditing of The Manner In Which The Teams Conduct Their Meetings Are Essential**

Each team should receive formal training in problem identification and problem solution techniques, as well as team building techniques, in advance of beginning its work. It is important that the team members understand that the training is formal and not just a "helpful hint" session. Time off the job for training is costly. The amount and quality of training provided can be an indication of Management's commitment to the process. Team members should understand that the training is being given because it is considered critical to the accomplishment of the team's work and not just a nice diversion from the day-to-day routine.

The training should include guidelines as to the methods by which problems are identified, for determining whether they are appropriate for a team to address, are capable of resolution by the team, or, if not, whether they lend themselves to analysis and recommended solution for implementation by a decision maker at another level.

One characteristic that was common to the ECC Team, the first Pipefitter Team and the Welder Team was their focus on a narrow issue. They each attacked a problem that had a clear identity, a target for which a rifle was a more appropriate weapon than a shotgun.

Periodically, during each team's life it should be audited by a professional trainer from the Human Resources Department to evaluate its performance in the concepts covered in the initial training sessions, to determine if retraining is called for and to identify specific additional training that may be required.

Problem solving teams should not be restricted to addressing only those problems that the team itself identifies. There are circumstances when it is perfectly appropriate to assign a problem solving team to address a problem that has surfaced elsewhere. The identity of such a problem and the selection (or creation) of a team to address it should be vetted by the Steering Committee before assignment.

7. **A Panel Consisting of All Team Leaders Should Be Established**

Regular meetings of the Team Leaders should be held with the future counterpart of the current Project Manager and with the Steering Committee (on a less frequent basis). Those meetings can serve several purposes, e.g.,

- keeping Operations Management and the Steering Committee abreast of each team's progress, its successes, its failures, its problems, etc.,
- providing a forum for formal recognition of and communication between Team Leaders, and
- providing the Team Leaders information to take back to their Teams.

Team Leaders should be selected on the basis of their ability to communicate up, down and across the management hierarchy.

8. **Guidelines for Presentations To Management Should Be Established By The Steering Committee**

In their responses to the Project Manager's questionnaire, both Teams indicated a need for guidance in making presentations to Management. This is another area which should be aired by the Steering Committee. The presentation of a recommended solution to a problem

should be made to the lowest level in the hierarchy that has the authority to implement the recommendation. As a general rule, only those recommended solutions to a significant Division-wide problem should be presented to Top Management. It should be the responsibility of the Team Leader, in consultations with the successor to the Project Manager, if necessary, to determine the level in the hierarchy to which to make the presentation.

Also, as a general rule, the presentation should contain, as essential elements: a clear but concise statement of the problem, the effects of the problem, the proposed alternative, facts in support of the alternative, the cost/benefit ratio, the recommendation and a brief statement of the plan for implementation.

Wherever possible, the presentation to Management should be assigned by the Team Leader to the hourly members of the team.

SECTION IX

AUTHORS NOTE

The Yard's experiences with each of the Problem Solving Teams, as written about in this Report, as written about elsewhere in the archives and as unwritten except in individual psyches, provide the bases for a number of observations about the establishment and functioning of problem solving teams in a shipyard environment. Problem solving teams have been the subject of a number of National Shipbuilding Research Program publications* which describe the manner in which teams in different shipyards were organized, conducted their business and obtained their results. The processes described in those publications describe formats that were used for implementing problem solving teams in a shipyard.

Those publications describe, in detail, steps taken for the establishment and functioning of employee involvement initiatives, including problem solving teams. They also provide instructive analyses of why some of their efforts were less successful than others. The question arises, then, why shouldn't any shipyard, intending to experiment with identical innovations, simply adopt, in toto, the successful processes described in these publications?

Each shipyard has its own "personality" which is the product of many factors including its own history, its size, its structure, its labor relations atmosphere, its product mix and its management style. It, therefore, must implement innovative employee involvement processes in a manner that suits its own "personality" rather than be controlled by what others in the industry may have done.

A search for a term that most aptly describes American shipbuilding industry's management style throughout its entire management structure uncovers only one — autocratic, a style that in certain environments is entirely appropriate. This description is neither original with this author nor intended to be pejorative. It is simply an historical fact of life in this industry and may be largely responsible for the greatness it once enjoyed.

Venturing anew into the employee involvement process entails a significant change in management style. Change is, of course, perceived by many to be personally threatening particularly if the reason for the change and the expected results are unknown. Those who are the first to explore the changed territory do so at some personal risk. In most environments, but especially in risk environments, we feel more secure doing things our own way rather than someone else's.

These remarks are included here in anticipation of the question which Section VIII, Observations, may prompt, "In light of what has been documented elsewhere in this industry, why did EB-GD try to reinvent the wheel?" The fact is, it did not. It simply explored and continues to explore those methods, systems and procedures with which it is most comfortable in establishing successful problem solving teams, given its unique "personality."

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* See Problem Solving Teams in Shipbuilding-Bethlehem Steel Corporation-Beaumont Yard dated November, 1986; Organizational Innovations in Shipyard Safety-Peterson Builders, Inc. dated May, 1987; and Multi-Skilled, Self-Managing Work Teams in a Zone-Construction Environment-National Steel and Shipbuilding Company, dated August, 1987.

PAPER NO. 1 SUBMITTED BY BARRY LONG
ASSISTANT GENERAL MANAGER
BEAUMONT YARD, BETHLEHEM STEEL CORP., BEAUMONT, TEXAS

COMMENTS ON GD/EB PROJECT SP5-85-1
"PROBLEM SOLVING TEAMS IN SHIPBUILDING"

As previously published NSRP papers indicate, this subject is a bottomless mine from which the assiduous digger can always uncover fresh jewels. The excitement lies in the awareness that the jewels revealed are always different, and this GD/EB contribution is no exception.

As with many other successful efforts in this field, the original initiative came from Operations management, and they obviously ran the effort with minimal input from conventional Human Resources personnel. I think this strong hands-on emphasis, coupled with an initial clear definition of "Off Limits Areas", was a major contributing factor to the astonishing 15:1 payback. Anything which returns over $700,000 for an investment of $45,000 during an eighteen month period is a SUCCESS!

A major difference between this project and similar efforts elsewhere, lies in the high degree of Management control. In spite of the existence of a Steering Committee, it is obvious that the Project Manager ran the process virtually single-handed, including picking the membership of the various teams. The actual teams were all led (controlled?) by relatively senior members of Operations management, and in at least one instance it seems that the people may have used the team as a device to present a new concept to top Management in a politically acceptable manner.

Interestingly enough, the very candid "Observations" indicate that in the future more use will be made of the Steering Committee, and less reliance placed on the personality of the Project Manager. Will leadership of the teams be permitted to pass into the hands of Union officers or hourly employees, or will Management still retain control of the agenda?

The achievements of the individual teams are interesting. I counted a total of nine (9) teams established: of these, one solved its problems immediately, three "died" for various reasons, one completed its assignment in a satisfactory manner, and the remaining four are very alive and operating efficiently. Considering the minimal training given to team members, and the even smaller amount of publicity apparently given to their efforts, this is an excellent record. The matters of training and general visibility are addressed at several points in the paper. Would it be a future intention to lean more towards volunteers as team members?

This project demonstrated a rather different approach to "Problem Solving Teams" to that adopted elsewhere. I think it also demonstrates that success depends not so much on procedures and techniques, but almost entirely upon the personal commitment of both management and mechanic participants. To GD/EB, and the members of 9 of your 10 Unions — "Well Done!"

PAPER NO. 2 SUBMITTED BY ROGER T. DAWLEY
BUSINESS REPRESENTATIVE, CARPENTER LOCAL #1302
REPRESENTING: METAL TRADES COUNCIL
NEW LONDON COUNTY, GROTON, CONNECTICUT

I commend all who participated in the preparation of this deliverable; it is accurate, descriptive, and is a true account of the SP-5 problem solving teams in shipbuilding project recently conducted at Electric Boat, Division of General Dynamics, Groton, Connecticut.

When asked to submit a paper regarding the problem solving team concept, it became obvious to me that most companies measure the success or failure by the immediate, obvious achievements of the project when, in fact, the greater rewards gained by the team members (both labor and management) do not just stop at the resolution of the solved problem. Here at Electric Boat, those individuals who had the opportunity to work together on the same level of authority, searching for a common solution, found that each could, and did, contribute in a manner that developed a mutual respect which enhanced their ability to carry the new found relationship to other unrelated shipyard assignments.

The one problem solving team that best substantiates my observations and the true value of the SP-5 project discussed in the deliverable, was the Equipment Control Center group.

Prior to the establishment of the team, the labor/management relationship left a lot to be desired. There

was little respect between the parties, minimal communication, and a who-gives-a-damn attitude held by some.

I will not attempt to review the accomplishments of the team, as the report is accurate and speaks for itself, although I would like to share some of the comments conveyed to me by the E.C.C. department superintendent and the union steward on separate occasions after the teams establishment. The superintendent stated that he never realized the knowledge his people had or the contribution they could provide and indicated he was enthusiastic and positive about the problems solving team concept. The steward stated before the implementation of the SP-5 project, he could not talk to the superintendent without a confrontation, days would go by and they wouldn't even speak; but now they share ideas, implement many, and the overall relationship has completely turned around.

The moral is that once communication, respect, and confidence have been established, productivity, profit and quality of work life will follow.

In conclusion, it would behoove Electric Boat, or anyone who contemplates incorporating problem solving teams, to publicize their presence and accomplishments to the highest degree possible.

PAPER NO. 3 SUBMITTED BY TOM COLLETTE AND BOB GREINER
PRODUCTIVITY PROGRAMS OFFICE
NORFOLK NAVAL SHIPYARD
PORTSMOUTH, VIRGINIA

Both management and the unions of Electric Boat are to be commended for their willingness to participate in an employee involvement process where positive outcomes could not be assured for either.

The observation section of this paper provides excellent insight into areas which need to be addressed by any organization undertaking this type effort. One area which was not addressed and may have been beneficial was that of using outside consultation during the start-up period. This may have lessened the degree of skepticism and doubt expressed initially by the unions and provided additional expertise and experience in this process, resulting in greater benefits for both the company and employees involved. The amount, type, and timing of training would probably have been enhanced. Along with this, an experienced facilitator would have been available to solve process problems and provide feedback to the steering committee on areas that needed additional attention. It is also felt that in an organization of this size a wider based pilot program with more employees involved would have enjoyed even greater success and potential for growth.

This report provides many useful examples of the process required to implement problem solving teams in a large industrial complex. These examples, as well as the lessons learned through their team self assessment, (especially in the area of training) can be applied with tailoring to other processes including Quality Circles, Performance Action Teams (PAT), etc., in other shipyards both private and public. Training in proven methods of problem solving techniques is very important to the success of any problem solving team. Perhaps the use of outside experts, as stated above, would have eased the minds of management and union officials. Therefore, the program gains acceptance because all involved are aware that they are on the right track when all speak the same problem solving language.

In summary, this study and the results of their efforts further reinforce the positive outcomes that can be achieved when synergistic approaches are taken to improve an organization's overall performance.

PAPER NO. 4 SUBMITTED BY DUANE WILLIAMS
PRODUCTIVITY PRINCIPAL
PUGET SOUND NAVAL SHIPYARD, BREMERTON, WASHINGTON

This is a very interesting paper and one which should be read more than once to glean the full benefit from it's contents. I am equally impressed with the candor of the report. Personnel problems with workers, managers, or union representatives are discussed rather than glossed over.

As indicated in Section IV EB-GD wanted to make a "quantum leap" in blue-collar productivity improvement after spending five years using traditional approaches. This was to be accomplished with only five problem-solving teams. How can approximately forty people out of a work force of approximately 30,000 be expected to make a "quantum leap"?

It is obvious that not a great deal of pre-planning was done to ensure a highly successful venture. There were no procedures set for selecting and disbanding problem solving teams, no standard training requirements for each team, no guidelines for presentations to management, and no method of publicizing the success of the teams.

However, under Section VIII "Observations" the author points out the lessons learned during the project and addresses in excellent detail the major points which must be followed correctly in order to be successful with problem solving teams. Except how do less than 1% of the workforce make a quantum leap?

In addition, we at PSNS have found that the frequency of meetings are as important as their regularity. Plus we have a Leaders Association that meets monthly to help further the process. There is also great value in making the team presentations with top management present to show them what they are getting for their money. We further recommend that all team members play some part in the management presentations.

It would appear that a great deal of the credit for the success of this project was largely due to the remarkable success of the Project Manager in selecting the team members, and although unwritten, his charisma and drive to make it work.

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I read, with great interest, General Dynamics-Electric Boat's report of their foray into the use of problem-solving teams in shipbuilding. One always hopes that experiments of this type will take one step further than we have already gone in tapping the expertise of employees within the shipyard. In this instance I was hoping to gain some insight as to how teams of the sort explored in this project could be woven into the mainstream of organizational life. Our goal in exploring these activities should be to integrate them into day-to-day business activities rather than having them as organizational oddities without the support necessary for them to work.

I feel the major contribution of the paper is contained in Section 8 "Observations." The eight items referenced in this section should be taken into account by anyone attempting to involve employees in a problem-solving activity. Comments regarding the need for management support, procedures for establishing and dismantling teams, for selecting team members, and the need for teams to meet on regular basis after having received training in problem solving and group process skills, are particularly worth noting. The suggestion for a panel of all team leaders is a good one, to make sure that the process has the visibility it needs to become integrated into the way a company does business. Having a set of guidelines for groups to follow in developing presentations to management, as well as having a procedure whereby such presentations are allowed and/or encouraged is essential for surfacing employee ideas.

An interesting point was brought up in the Authors Note section. He notes that each shipyard has its own "personality" which prevents one yard from taking another's experiences and applying them unchanged in the second yard. It should be noted that even within yards, this general conclusion can be drawn about individual teams.

Just because some aspect of human resource innovation is attempted in one area with less than satisfactory results does not mean that a similar attempt can not be made in another area and be quite successful. The common denominator of these efforts is the fact that they involve people. The variety of individuals and their receptivity to change in an organization is quite extensive. The success or failure of these efforts depends on how well the organization supports the activity by paying attention to such things as assigning the proper managers to oversee the effort, providing the proper training for team members, and by establishing a feedback system that operates as a normal communications channel to make the organization aware of improvements that are possible. To the extent that these factors are adequately addressed, the chances of success are increased.

A few miscellaneous notes:

When a company first embarks on an employee involvement effort, environmental issues will often come up as the first items of discussion as they did in the Painter's Team at Electric Boat. Management must recognize these efforts are long term, and require that the employee's physical needs be taken care of first, before they are willing to consider other issues, such as productivity improvements. Many companies have found out that Maslow was correct in his description of a hierarchy of needs.

Union involvement and understanding is essential if efforts of these types are going to be successful. Resolving issues is much easier if they are identified prior to problems coming up.

The only stated objective of the Electric Boat project was increased producitivity. Increased employee satisfaction should not be overlooked as a benefit of involving employees in decisions that affect them at work.

Having teams of this type concentrate on problems with a narrow focus is good. The chances of arriving at a solution to such problems is much greater and the chances of having the solution actually implemented is increased as well.

Management should not shy away from assigning problems to teams of employees. Most groups of employees enjoy the challenge of being presented with a problem and suggesting ways to solve it. Having management suggest problems to work on is a way to make sure that the needs of both parties are met.

I believe the paper would have benefited from a greater concentration on analysis of the process which occurred in implementing problem-solving teams rather than a description of the results of these efforts. Much can be learned from the successes and failures in these instances; however, the factors which led to the success or failure must be analyzed and presented.

Overall the paper is a good one and worthy of review by anyone interested in beginning an employee involvement program of this type.